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(71)出願人　000135254
株式会社ニレコ
東京都八王子市石川町2951番地４

(72)発明者　霧島　明
東京都八王子市石川町2951番地４　株式会社ニレコ内

(72)発明者　山下　敏広
東京都八王子市石川町2951番地４　株式会社ニレコ内

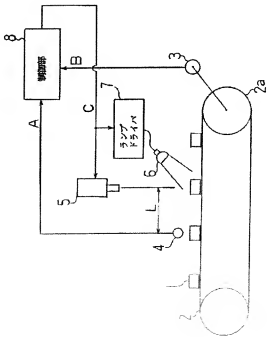
(74)代理人　弁理士　奈良　繁

(54)【発明の名称】　移動物体の撮像装置

(57)【要約】

【目的】　移動物体撮像用の照明装置の寿命を長くする。

【構成】　移動物体検出器４と、移動物体１の移動距離を測定するエンコーダ３と、テレビカメラ５と、照明装置６，７と、移動物体検出器４とエンコーダ３の出力から、移動物体１がテレビカメラ５の位置にきたときトリガ信号を出力する制御部８とを備え、テレビカメラ５はトリガ信号によりＣＣＤ撮像素子を所定時間動作させるシャッタ部を有し、照明装置６，７はトリガ信号により点灯し、テレビカメラ５のシャッタ部動作時間とほぼ同じ時間点灯する。



【特許請求の範囲】

【請求項1】　移動物体を検出し検出信号を出力する移動物体検出器と、移動物体の移動距離を測定する移動距離測定器と、移動物体の撮像位置に設けられ移動物体を撮像するテレビカメラと、前記撮像位置を照明する照明装置と、前記検出信号と前記移動距離測定器からの移動距離を入力し、移動物体が撮像位置にくるときを算出してトリガ信号を出力する制御部とを備え、
前記テレビカメラは、撮像を電気信号に変換する際の電荷蓄積時間が設定可能な固体撮像素子を有し、前記トリガ信号により固体撮像素子を動作させ、
前記照明装置は、前記トリガ信号により点灯し、前記固体撮像素子が電荷を蓄積している時間とほぼ同じ時間点灯を持続することを特徴とする移動物体の撮像装置。

【請求項2】　前記照明装置は、照明体を周期Ｔ、点灯時間をｔ（≪Ｔ）で点灯する場合、照明体への通電電流を照明体の定格電流のほぼＴ／（１０ｔ）～１倍の範囲とすることを特徴とする請求項１記載の移動物体の撮像装置。

【発明の詳細な説明】

【０００１】

【産業上の利用分野】本発明は移動物体を照明して撮像する移動物体の撮像装置に関する。

【０００２】

【従来の技術】ベルトラインなどに搭載されて移送される製品などを検査するため、テレビカメラなどで撮像して静止面を得て、これを表示装置に表示し、欠陥等を検出することが行われている。このような撮像方法としてストロボにより照明する方法や電子的シャッタを備えたテレビカメラを用いる方法がある。

【０００３】ストロボを用いる方法では、テレビカメラは移動物体を撮像する撮像位置を常に撮像しており、移動物体が撮像位置を通過する時、ストロボを発光する。また、電子的シャッタを備えたテレビカメラは、ＣＣＤ（チャージ・カップルド・デバイス）撮像素子が主として用いられ、ＣＣＤ撮像素子の電荷蓄積時間を予め設定できるようにしたものである。これによりＣＣＤ撮像素子は動作開始から設定された時間まで動作するので、シャッタ機能を有することになる。この撮像方法は、移動物体の撮像位置を常に照明しておき、撮像位置を移動物体が通過するとき電子的シャッタが動作して撮像する方法である。

【０００４】

【発明が解決しようとする課題】ストロボを用いる場合、ストロボは高価であり、ストロボ放電管の寿命が短く、頻繁に交換しなければならない。また、発光時、騒音を発生する。また、テレビカメラは常に動作しているため、ストロボ非発光時にも環境光がテレビカメラに入光するので画面が劣化（ブレ）を生ずる。このため通常、撮像装置全体を暗箱に入れる等の処理がなされている。

【０００５】電子的シャッタを備えたテレビカメラを用いて撮像する場合、撮像する時間が短いので、この短い時間に良質な画像を得る為にはハロゲンランプ等で強力に照明する必要があり、このため照明管の寿命が短いという問題点がある。

【０００６】本発明は上述の問題点に鑑みてなされたもので、電荷蓄積時間を設定することの出来る固体撮像素子を用い、照明時間を電荷蓄積時間とほぼ同じくすることにより照明装置の寿命を長くする移動物体の撮像装置を提供することを目的とする。また、低輝度の光源に短時間過電流を印加することにより十分な照明が得られるようにする。

【０００７】

【課題を解決するための手段】上記目的を達成するため、移動物体を検出し検出信号を出力する移動物体検出器と、移動物体の移動距離を測定する移動距離測定器と、移動物体の撮像位置に設けられ移動物体を撮像するテレビカメラと、前記撮像位置を照明する照明装置と、前記検出信号と前記移動距離測定器からの移動距離を入力し、移動物体が撮像位置にくるときを算出してトリガ信号を出力する制御部とを備え、前記テレビカメラは、撮像を電気信号に変換する際の電荷蓄積時間が設定可能な固体撮像素子を有し、前記トリガ信号により固体撮像素子を動作させ、前記照明装置は、前記トリガ信号により点灯し、前記固体撮像素子が電荷を蓄積している時間とほぼ同じ時間点灯を持続するようにしたものである。

【０００８】また、前記照明装置は、照明体を周期Ｔ、点灯時間をｔ（≪Ｔ）で点灯する場合、照明体への通電電流を照明体の定格電流のほぼＴ／（１０ｔ）～１倍の範囲とするようにしたものである。

【０００９】

【作用】移動物体が撮像位置にきたとき、トリガ信号が制御部より出力されるとテレビカメラの固体撮像素子が動作し、設定された時間電荷を蓄積し移動物体の撮像が行われる。この固体撮像素子と同時にトリガ信号を入力した照明装置は点灯を開始し、ほぼ固体撮像素子の電荷蓄積時間点灯した後に点灯を終了する。これにより、照明装置の点灯時間は撮像時間とほぼ同じ時間程度の少ない時間であるので、従来のように常時点灯している場合に比べ、照明装置の寿命が長くなり、温度上昇も少なく、エネルギー消費も少なくなる。

【００１０】照明装置が周期的に点灯し、その周期内での点灯時間ｔが周期Ｔに比べ短い場合（ｔ≪Ｔ）は、点灯電流を照明体の定格電流のＴ／ｔ倍にしても短時間の通電なので寿命に影響を与えない。安全をみてＴ／（１０ｔ）倍程度の過電流とする。これにより比較的低輝度の光源、例えば、発光ダイオードを用いても実用上十分な照明が得られる。

【００１１】

【実施例】以下、本発明の実施例について図面を参照し

て説明する。図1は実施例の構成を示すブロック図である。図1において、1は移動物体で、検査などのために撮像される。2は移動物体1を搬送するベルトコンベアで左右に設けられたローラ2aにより移動物体1を一定の速度で搬送する。3はローラ2aの回転軸の回転を検出するエンコーダで、ベルトコンベア2の搬送距離、つまり移動物体1の移動距離に対応してパルスBを発生する。このパルス数を計数すると移動物体1の移動距離が得られる。4は移動物体検出器で近接センサを備え、ベルトコンベア2のあらかじめ定められた位置を通過する移動物体1を検出し、物体検出信号Aを出力する。

【0012】テレビカメラ5はベルトコンベア2直上で、移動物体検出器4より距離L下流の撮像位置に設けられている。CCD撮像素子を内蔵し、このCCD撮像素子は電荷蓄積時間を予め設定できるように構成されている。なお、CCD撮像素子の代わりにMOSなど他の固体撮像素子を用いてもよい。電荷蓄積時間は数10μsから数100μsの範囲で設定できるようになっている。照明ランプ6は撮像位置を照明するように配置される。発光素子として発光が瞬時に生じる発光ダイオードなどが用いられる。発光ダイオードは安価で寿命が長く、消費電力も少ない。

【0013】ランプドライバ7は照明ランプ6に通電し、発光素子を所定時間発光をさせる。発光時間はタイマーにより調整するようにし、テレビカメラ5の電荷蓄積設定時間より少し長くなるようにタイマーを設定する。これによりCCD撮像素子が動作している間は移動物体1は確実に照明される。制御部8は移動物体検出器4から物体検出信号Aを入力すると、エンコーダ3からのパルスBを計数し、移動物体1が移動物体検出器4より距離L移動してテレビカメラ5の直下の撮像位置にきたとき、トリガCを発生する。このトリガCによりテレビカメラ5はCCD撮像素子を動作させ、設定された電荷蓄積時間後に動作を停止し、ランプドライバ7は照明ランプ6を点灯させ設定された時間後消灯する。

【0014】図2は本実施例のタイミングチャートを示す。移動物体検出器4より物体検出信号Aが出力された後、移動物体1が距離L移動してテレビカメラ5直下の撮像位置にきたとき、トリガCが制御部8より出力される。トリガCにより照明ランプ6は瞬時に点灯し、テレビカメラ5のCCD撮像素子は動作を開始し、電荷蓄積設定時間が過ぎると停止する。少し遅れて照明ランプ6も消灯する。

【0015】次に照明ランプ6に用いる発光素子の通電電流について説明する。移動物体1が出現する繰り返し時間（周期）Tを1／10秒、テレビカメラ5のCCD撮像素子の電荷蓄積設定時間、つまり照明ランプ6を点灯の最小必要時間tを100μs（0.1ms）とした場合、デューテイ比（t／T）は1／1000となる。発光素子の定格電流は発熱により制限されているので、このようなデューテイ比で通電する場合、発熱量が定格電流の時と同じになる電流値は1000倍となるが、安全率を10とし、定格電流の100倍で1周期の1／1000時間通電することができる。以上は一例を説明したものであるが、このように短時間の通電には大電流が可能であるので、比較的低輝度の光源である発光ダイオード（LED）を用いても、短時間通電流を通電することにより寿命を短くすることなく実用上十分な照明が得られる。

【0016】次に環境光の影響について説明する。環境光は、照明ランプ6以外の光源から移動物体1に照射される光である。テレビカメラ5はCCD撮像素子の動作時間内の撮像を取り込むが、この期間は照明ランプ6による光と環境光とが加算される。なお、ストロボを用いる場合は、テレビカメラ5は常に開放されているので、ストロボ発光時以外の時は環境光のみが入射される。移動物体1は常に移動しているので、発光時の像と非発光時の環境光による像とが重なり画像がぶれた状態となって画質が劣化する。テレビカメラ5にシャッタ機能を持たせることにより、ストロボ撮影に伴う欠点を除去することができ、かつ環境光を積極的に利用することができる。

【0017】

【発明の効果】以上の説明から明らかなように、本発明はテレビカメラの固体撮像素子にシャッタ機能を有するものを用い、この固体撮像素子の動作時間とほぼ同期間のみ移動物体を照明するようにしたので、照明用光源の寿命を長くすることができる。また、発光時間が短い場合は、定格電流で低輝度の発光素子に対して過電流を印加することにより寿命を短くすることなく十分な照明を得ることができる。

【図面の簡単な説明】

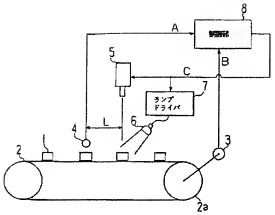
【図1】本実施例の構成を示すブロック図である。

【図2】本実施例のタイミングチャートである。

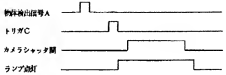
【符号の説明】

1　移動物体
2　ベルトコンベア
3　エンコーダ
4　移動物体検出器
5　テレビカメラ
6　照明ランプ
7　ランプドライバ
8　制御部

【図1】



【図2】



PATENT ABSTRACTS OF JAPAN

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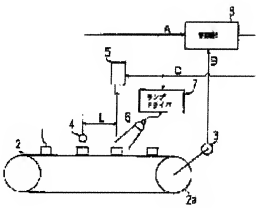
(71)Applicant : NIRECO CORP
(72)Inventor : SHIMOTORI AKIRA
YAMASHITA TOSHIHIRO

(54) PHOTOGRAPHING DEVICE FOR TRAVEL BODY

(57)Abstract:
PURPOSE: To extend the service life of a lighting device for photographing a travel body.
CONSTITUTION: This device is equipped with a travel body detector 4, an encoder 3 for measuring the travel distance of a travel body 1, a TV camera 5, lighting devices 6 and 7, and a control section 8 for outputting a trigger signal, upon receipt of output signals from the detector 4 and the encoder 3, due to the arrival of the body 1 at the position of the camera 5. Also, the camera 5 has a shutter for causing CCD image pickup elements to operate for the preset time, upon receipt of the trigger signal. In addition, the lighting devices 6 and 7 are turned on with the trigger signal and continue to light for the approximately same period as the shutter operation time of the camera 5.



CLAIMS

[Claim(s)]

[Claim 1]Have the following and it has a solid state image pickup device which can set up charge storage time at the time of said television camera changing an image pick-up into an electrical signal, An imaging device of a movable matter object which operates a solid state image pickup device by said trigger signal, turns on said lighting system by said trigger signal, and is characterized by maintaining the almost same time point light as time when said solid state image pickup device is accumulating an electric charge.

A moving object detector which detects a movable matter object and outputs a detecting signal.

A migration length measuring instrument which measures migration length of a movable matter object.

A television camera which is provided in an image pickup position of a movable matter object, and picturizes a movable matter object.

A control section which inputs said detecting signal and migration length from said migration length measuring instrument as a lighting system which illuminates said image pickup position, computes a time of a movable matter object coming to an image pickup position, and outputs a trigger signal.

[Claim 2]An imaging device of the movable matter object according to claim 1 when an illuminating body is turned on the cycle T and it turns [said lighting system] on lighting times by t (<<T), wherein it makes energization current to an illuminating body an about T/(10t) - 1 time as much range as amperage rating of an illuminating body.

DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Industrial Application]This invention relates to the imaging device of the movable matter object which illuminates and picturizes a movable matter object.

[0002]

[Description of the Prior Art]In order to inspect the product etc. which are carried and transported to a beltline etc., it picturizes with a television camera etc., a stillness side is acquired, this is displayed on a display, and detecting a defect etc. is performed. There is a method of using the television camera provided with the method of illuminating with a stroboscope or the electronic shutter as such an imaging method.

[0003]In the method of using a stroboscope, a television camera emits light in a stroboscope, when the image pickup position which picturizes a movable matter object is always picturized and a movable matter object passes through an image pickup position. A CCD (charge coupled device) image sensor is mainly used, and the television camera provided with the electronic shutter enables it to set up the charge storage time of a CCD image sensor beforehand. Since the

CCD image sensor operates till the time set up from the operation start, this will have shutter functions. This imaging method is a method which an electronic shutter operates and picturizes, when the image pickup position of the movable matter object is always illuminated and a movable matter object passes through an image pickup position.

[0004]

[Problem(s) to be Solved by the Invention]When using a stroboscope, the stroboscope is expensive, and its life of a stroboscopic tube is short, and they must be exchanged frequently. Noise is generated at the time of luminescence. Since the television camera is always operating, and environment light carries out entering light to a television camera also at the time of stroboscope nonluminescent, it is accompanied by degradation (Bure) of a screen. For this reason, processing of putting the whole imaging device into a camera is usually made.

[0005]Since time to picturize is short when picturizing using the television camera provided with the electronic shutter, in order to acquire a good picture at this short time, it is necessary to illuminate powerfully with a halogen lamp etc., and, for this reason, there is a problem that the life of an illumination tube is short.

[0006]This invention was made in view of the above-mentioned problem, and an object of this invention is to provide the imaging device of the movable matter object which lengthens the life of a lighting system by making lighting time almost the same with charge storage time using the solid state image pickup device which can set up charge storage time. Sufficient lighting is obtained by impressing a short-time over-current to a low-intensity light source.

[0007]

[Means for Solving the Problem]A moving object detector which detects a movable matter object and outputs a detecting signal in order to attain the above-mentioned purpose, A migration length measuring instrument which measures migration length of a movable matter object, and a television camera which is provided in an image pickup position of a movable matter object, and picturizes a movable matter object, Said detecting signal and migration length from said migration length measuring instrument are inputted as a lighting system which illuminates said image pickup position, Have a control section which computes a time of a movable matter object coming to an image pickup position, and outputs a trigger signal, and said television camera, Have a solid state image pickup device which can set up charge storage time at the time of changing an image pick-up into an electrical signal, make the solid state image pickup device operate it by said trigger signal, and said lighting system, The light is switched on by said trigger signal, and the almost same time point light as time when said solid state image pickup device is accumulating an electric charge is maintained.

[0008]Said lighting system is made to make energization current to an illuminating body an about T/(10t) - 1 time as much range as amperage rating of an illuminating body, when an illuminating body is turned on the cycle T and it turns on lighting times by t (<<T).

[0009]

[Function]When a movable matter object comes to an image pickup position, if a trigger signal is outputted from a control section, the solid state image pickup device of a television camera will

operate, and will accumulate the set-up time electric charge, and the image pick-up of a movable matter object will be performed. The lighting system which inputted the trigger signal simultaneously with this solid state image pickup device starts lighting, and after a solid state image pickup device carries out charge-storage-time lighting mostly, it ends lighting. Thereby, since the lighting times of a lighting system are time with few almost same time grades as imaging time, compared with the case where the light is always switched on like before, the life of a lighting system becomes long, there are also few rises in heat and its energy expenditure also decreases.

[0010]A lighting system lights up periodically, and since it is short-time energization even if it makes lighting current T/t twice the amperage rating of an illuminating body, when short [the lighting times t within the cycle] ($t<<T$) compared with the cycle T, a life is not affected. Safety is seen and it is considered as a T / (10t) about [twice] over-current. Even if it uses a thereby comparatively low-intensity light source, for example, a light emitting diode, practically sufficient lighting is obtained.

[0011]

[Example]Hereafter, the example of this invention is described with reference to drawings. Drawing 1 is a block diagram showing the composition of an example. In drawing 1, 1 is a movable matter object and is picturized for an inspection etc. 2 conveys the movable matter object 1 at a fixed speed with the roller 2a formed in right and left on the band conveyor which conveys the movable matter object 1. 3 is an encoder which detects rotation of the axis of rotation of the roller 2a, and generates the pulse B corresponding to the carrying distance of the band conveyor 2, i.e., the migration length of the movable matter object 1. Calculation of this pulse number will acquire the migration length of the movable matter object 1. 4 is provided with a proximity sensor by a moving object detector, detects the movable matter object 1 which passes the position as which the band conveyor 2 was determined beforehand, and outputs the object detection signal A.

[0012]The television camera 5 is right above [band-conveyor 2], and is provided in the image pickup position of the distance L lower stream from the moving object detector 4. A CCD image sensor is built in, and this CCD image sensor is constituted so that charge storage time can be set up beforehand. Other solid state image pickup devices, such as MOS, may be used instead of a CCD image sensor. Charge storage time can be set up now in the range for several 10 to several 100 microseconds. The lighting lamp 6 is arranged so that an image pickup position may be illuminated. The light emitting diode etc. which luminescence produces in an instant as a light emitting device are used. A light emitting diode is cheap, and is long-life, and there is also little power consumption.

[0013]The lamp driver 7 is energized to the lighting lamp 6, and carries out predetermined time luminescence for a light emitting device. Emission time is adjusted with a timer and a timer is set up become somewhat longer than the charge storage set period of the television camera 5. While the CCD image sensor is operating by this, the movable matter object 1 is illuminated certainly. If the object detection signal A is inputted from the moving object detector 4, the control section

8 calculates the pulse B from the encoder 3, and when the movable matter object 1 does distance L movement of and comes to the image pickup position [directly under] of the television camera 5 from the moving object detector 4, it will generate the trigger C. The television camera 5 operates a CCD image sensor by this trigger C, operation is suspended after the set-up charge storage time, and the lamp driver 7 is switched off after the time which made turn on the lighting lamp 6 and was set up.

[0014]Drawing 2 shows the timing chart of this example. When the movable matter object 1 does distance L movement of and it comes to the image pickup position of television camera 5 directly under after the object detection signal A was outputted from the moving object detector 4, the trigger C is outputted from the control section 8. The lighting lamp 6 is turned on in an instant by the trigger C, and operation is started, and the CCD image sensor of the television camera 5 will suspend it, if a charge storage set period passes. It is behind for a while and the lighting lamp 6 is also switched off.

[0015]Next, the energization current of the light emitting device used for the lighting lamp 6 is explained. When the movable matter object 1 sets the charge storage set period t of the CCD image sensor of the television camera 5, i.e., the minimum required time of lighting lamp 6 lighting, to 100 microseconds (0.1 ms) for appearing repetition time (cycle) T for 1 / 10 seconds, a duty ratio (t/T) will be 1/1000. the current value which becomes the same as the time of calorific value being amperage rating being 1000 times when energizing with such a duty ratio since the amperage rating of the light emitting device is restricted by generation of heat, but setting a safety ratio to 10 -- 100 times of amperage rating -- 1/of one cycle -- it can energize for 1000 hours. Although the above explains an example, since the high current is possible to short-time energization in this way, even if it uses the light emitting diode (LED) which is a comparatively low-intensity light source, practically sufficient lighting is obtained without shortening a life by energizing a short-time over-current.

[0016]Next, the influence of environment light is explained. Environment light is a light irradiated by the movable matter object 1 from light sources other than lighting lamp 6. Although the television camera 5 incorporates the image pick-up within the operating time of a CCD image sensor, light and environment light according [this period] to the lighting lamp 6 are added. Since the television camera 5 is always wide opened when using a stroboscope, only environment light enters at the times other than the time of a strobe light. Since the movable matter object 1 is always moving, it will be in the state where the image at the time of luminescence and the image by the environment light at the time of nonluminescent lapped, and the picture blurred, and image quality will deteriorate. By giving shutter functions to the television camera 5, the fault accompanying speed light photography can be removed, and environment light can be used positively.

[0017]

[Effect of the Invention]Since, as for this invention, only same tenor illuminated the movable matter object mostly with the operating time of this solid state image pickup device using what has shutter functions to the solid state image pickup device of the television camera so that

clearly from the above explanation, the life of the light source for lighting can be lengthened. When emission time is short, sufficient lighting can be obtained without shortening a life by impressing an over-current to a low-intensity light emitting device by amperage rating.

TECHNICAL FIELD

[Industrial Application]This invention relates to the imaging device of the movable matter object which illuminates and picturizes a movable matter object.

PRIOR ART

[Description of the Prior Art]In order to inspect the product etc. which are carried and transported to a beltline etc., it picturizes with a television camera etc., a stillness side is acquired, this is displayed on a display, and detecting a defect etc. is performed. There is a method of using the television camera provided with the method of illuminating with a stroboscope or the electronic shutter as such an imaging method.

[0003]In the method of using a stroboscope, a television camera emits light in a stroboscope, when the image pickup position which picturizes a movable matter object is always picturized and a movable matter object passes through an image pickup position. A CCD (charge coupled device) image sensor is mainly used, and the television camera provided with the electronic shutter enables it to set up the charge storage time of a CCD image sensor beforehand. Since the CCD image sensor operates till the time set up from the operation start, this will have shutter functions. This imaging method is a method which an electronic shutter operates and picturizes, when the image pickup position of the movable matter object is always illuminated and a movable matter object passes through an image pickup position.

EFFECT OF THE INVENTION

[Effect of the Invention]Since, as for this invention, only same tenor illuminated the movable matter object mostly with the operating time of this solid state image pickup device using what has shutter functions to the solid state image pickup device of the television camera so that clearly from the above explanation, the life of the light source for lighting can be lengthened. When emission time is short, sufficient lighting can be obtained without shortening a life by impressing an over-current to a low-intensity light emitting device by amperage rating.

TECHNICAL PROBLEM

[Problem(s) to be Solved by the Invention]When using a stroboscope, the stroboscope is expensive, and its life of a stroboscopic tube is short, and they must be exchanged frequently. Noise is generated at the time of luminescence. Since the television camera is always operating, and environment light carries out entering light to a television camera also at the time of stroboscope nonluminescent, it is accompanied by degradation (Bure) of a screen. For this reason, processing of putting the whole imaging device into a camera is usually made.

[0005]Since time to picturize is short when picturizing using the television camera provided with the electronic shutter, in order to acquire a good picture at this short time, it is necessary to illuminate powerfully with a halogen lamp etc., and, for this reason, there is a problem that the life of an illumination tube is short.

[0006]This invention was made in view of the above-mentioned problem, and an object of this invention is to provide the imaging device of the movable matter object which lengthens the life of a lighting system by making lighting time almost the same with charge storage time using the solid state image pickup device which can set up charge storage time. Sufficient lighting is obtained by impressing a short-time over-current to a low-intensity light source.

MEANS

[Means for Solving the Problem]A moving object detector which detects a movable matter object and outputs a detecting signal in order to attain the above-mentioned purpose, A migration length measuring instrument which measures migration length of a movable matter object, and a television camera which is provided in an image pickup position of a movable matter object, and picturizes a movable matter object, Said detecting signal and migration length from said migration length measuring instrument are inputted as a lighting system which illuminates said image pickup position, Have a control section which computes a time of a movable matter object coming to an image pickup position, and outputs a trigger signal, and said television camera, Have a solid state image pickup device which can set up charge storage time at the time of changing an image pick-up into an electrical signal, make the solid state image pickup device operate it by said trigger signal, and said lighting system, The light is switched on by said trigger signal, and the almost same time point light as time when said solid state image pickup device is accumulating an electric charge is maintained.

[0008]Said lighting system is made to make energization current to an illuminating body an about T/(10t) - 1 time as much range as amperage rating of an illuminating body, when an illuminating body is turned on the cycle T and it turns on lighting times by t (<<T).

OPERATION

[Function]When a movable matter object comes to an image pickup position, if a trigger signal is outputted from a control section, the solid state image pickup device of a television camera will operate, and will accumulate the set-up time electric charge, and the image pick-up of a movable

matter object will be performed. The lighting system which inputted the trigger signal simultaneously with this solid state image pickup device starts lighting, and after a solid state image pickup device carries out charge-storage-time lighting mostly, it ends lighting. Thereby, since the lighting times of a lighting system are time with few almost same time grades as imaging time, compared with the case where the light is always switched on like before, the life of a lighting system becomes long, there are also few rises in heat and its energy expenditure also decreases.

[0010]A lighting system lights up periodically, and since it is short-time energization even if it makes lighting current T/t twice the amperage rating of an illuminating body, when short [the lighting times t within the cycle] (t<<T) compared with the cycle T, a life is not affected. Safety is seen and it is considered as a T / (10t) about [twice] over-current. Even if it uses a thereby comparatively low-intensity light source, for example, a light emitting diode, practically sufficient lighting is obtained.

EXAMPLE

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DESCRIPTION OF DRAWINGS

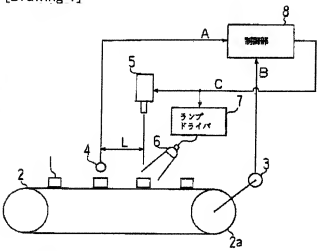
[Brief Description of the Drawings]
[Drawing 1]It is a block diagram showing the composition of this example.
[Drawing 2]It is a timing chart of this example.
[Description of Notations]
1 Movable matter object
2 Band conveyor
3 Encoder
4 Moving object detector
5 Television camera
6 Lighting lamp
7 Lamp driver
8 Control section

* NOTICES *

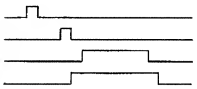
1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

DRAWINGS

[Drawing 1]



[Drawing 2]



[Translation done.]